

## CLAIMS

1. In a process for removing a trace level of Group IVb and Vb metal contaminant from a Group IVb metal tetrahalide by volatilization, the improvement for reducing the level of said Group IVb and Vb metal contaminants from said Group IVb metal tetrahalide which comprises the steps of:

(a) contacting said Group IVb metal tetrahalide containing a trace level of a Group IVb metal or a Group Vb metal contaminant or both, with a sufficient amount of a Group IVb metal hydride under conditions for converting said Group IVb and Group Vb metal contaminant to a lower volatile compound;

(b) separating the Group IVb metal tetrahalide from said lower volatile compound by a vaporization method selected from the group consisting of distillation, sublimation and combinations thereof; and,

(c) recovering the resulting Group IVb metal tetrahalide having a reduced level of a Group IVb or Vb metal contaminant as a more volatile component from said lower volatile compound.

2. The process of Claim 1 wherein the contacting temperature ranges from 50 to 150°C.

3. The process of Claim 2 wherein the Group IVb metal hydride is added to a reboiler for the distillation column.

4. The process of Claim 1 where the Group IVb tetrahalide to be purified by having contaminants removed therefrom is first dissolved in a nonreactive medium to allow intimate contact with the hydride purification agent and then, the nonreactive medium is removed prior to purification of the product by sublimation.

5. The process of Claim 2 wherein the Group IVb metal tetrahalide is selected from the group consisting of titanium tetrahalide, zirconium tetrahalide and mixtures thereof.

6. The process of Claim 2 wherein the Group IVb metal hydride is added at a level that results in the reduction of a Group IV b and Vb metal contaminant to less than 1ppb each.

7. The process of Claim 2 wherein the Group IVb metal hydride is added in the range of 0.01% to 0.2% by weight of the Group IVb metal tetrahalide having contaminants removed therefrom.

8. The process of Claim 5 wherein the Group IVb metal tetrahalide is a Group IVb metal tetrachloride or tetrabromide.

9. In a distillation process for removing trace levels of a Group IVb metal or a Group Vb metal or both from a titanium tetrachloride feedstock contaminated with trace levels of a Group IVb metal or a Group Vb metal or both, the improvement for generating a high purity titanium tetrachloride which comprises the steps:

(a) contacting said titanium tetrachloride feedstock contaminated with trace levels of a Group IVb or Group Vb metal or both with a sufficient amount of titanium hydride to convert Group IVb or Group Vb metal to a lower volatile compound;

(b) distilling the treated feedstock in a distillation column thereby separating the titanium tetrachloride from the lower volatile compound of a Group IVb or Group Vb metal; and,

(c) recovering the resulting high purity titanium tetrachloride as an overhead fraction.

10. The process of Claim 9 wherein the Group IVb metals are zirconium tetrachloride or hafnium tetrachloride.

11. The process of Claim 9 wherein the temperature of said contacting ranges from 50 to 150°C.

12. The process of Claim 9 wherein the titanium hydride is added to a reboiler for the distillation column.

13. The process of Claim 9 wherein the titanium hydride is added in a range of at least a stoichiometric amount up to about 0.02% by weight of the titanium tetrachloride to remove substantially any Group IVb metal or Group Vb metal contaminant therefrom.